UTILITY PATENT APPLICATION TRANSMITTAL

(Only for new nonprovisional applications under 37 CFR 1.53(b))

Attorney Docket No.	862.2914
First Named Inventor or Application Identifier	
MASAMI KATO	
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APPLICATION ELEMENTS

See MPEP chapter 600 concerning utility patent application contents.

ADDRESS TO: Assistant Commissioner for Patents
Box Patent Application
Washington, DC 20231

1. [ ] Fee Transmittal Form
(Submit an original, and a duplicate for fee processing)

2. [X] Specification — *Total Pages* 40

3. [X] Drawing(s) *(35 USC 113)* — *Total Sheets* 7

4. [X] Oath or Declaration — *Total Pages* 1

   a. [X] Newly executed (original or copy)
   b. [ ] Unexecuted for information purposes
   c. [ ] Copy from a prior application (37 CFR 1.63(d))
   (for continuation/divisional with Box 17 completed)
   [Note Box 5 below]
   i. [ ] DELETION OF INVENTOR(S)
   Signed Statement attached deleting inventor(s) named in the prior application, see 37 CFR 1.63(d)(2) and 1.33(b).

5. [ ] Incorporation By Reference *(useable if Box 4c is checked)*
The entire disclosure of the prior application, from which a copy of the oath or declaration is supplied under Box 4c, is considered as being part of the disclosure of the accompanying application and is hereby incorporated by reference therein.

6. [ ] Microfiche Computer Program *(Appendix)*

7. Nucleotide and/or Amino Acid Sequence Submission
(if applicable, all necessary)
   a. [ ] Computer Readable Copy
   b. [ ] Paper Copy (identical to computer copy)
   c. [ ] Statement verifying identity of above copies

ACCOMPANYING APPLICATION PARTS

8. [X] Assignment Papers (cover sheet & document(s))

9. [ ] 37 CFR 3.73(b) Statement *(when there is an assignee)* [ ] Power of Attorney

10. [ ] English Translation Document *(if applicable)*

11. [ ] Information Disclosure Statement (IDS)/PTO-1449 [ ] Copies of IDS Citations

12. [ ] Preliminary Amendment

13. [X] Return Receipt Postcard (MPEP 503)
(Should be specifically itemized)

14. [ ] Small Entity [ ] Statement filed in prior application
Statement(s) Status still proper and desired

15. [ ] Certified Copy of Priority Document(s)
(if foreign priority is claimed)

16. [ ] Other: _____

17. If a CONTINUING APPLICATION, *check appropriate box and supply the requisite information:*
[ ] Continuation [ ] Divisional [ ] Continuation-in-part (CIP) of prior application No. __/_____

18. CORRESPONDENCE ADDRESS

[X] Customer Number or Bar Code Label — 05514 (Insert Customer No. or Attach bar code label here) or [ ] Correspondence address below

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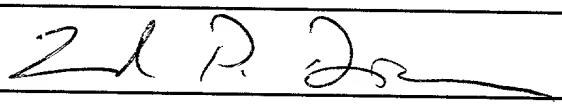
CLAIMS	(1) FOR	(2) NUMBER FILED	(3) NUMBER EXTRA	(4) RATE	(5) CALCULATIONS
	TOTAL CLAIMS (37 CFR 1.16(c))	47-20 =	27	X $ 18.00 =	$ 486.00
	INDEPENDENT CLAIMS (37 cfr 1.16(b))	12-3 =	9	X $ 78.00 =	$ 702.00
	MULTIPLE DEPENDENT CLAIMS (if applicable) (37 CFR 1.16(d))			$260.00 =	$0
				BASIC FEE (37 CFR 1.16(a))	$ 760.00
			Total of above Calculations =		$1948.00
	Reduction by 50% for filing by small entity (Note 37 CFR 1.9, 1.27, 1.28).				0
				TOTAL =	$1948.00

19. Small entity status
    - a. ☐ A Small entity statement is enclosed
    - b. ☐ A small entity statement was filed in the prior nonprovisional application and such status is still proper and desired.
    - c. ☐ Is no longer claimed.

20. ☒ A check in the amount of $ 1948.00 to cover the filing fee is enclosed.

21. ☒ A check in the amount of $ 40.00 to cover the recordal fee is enclosed.

22. The Commissioner is hereby authorized to credit overpayments or charge the following fees to Deposit Account No. 06-1205:
    - a. ☒ Fees required under 37 CFR 1.16.
    - b. ☒ Fees required under 37 CFR 1.17.
    - c. ☐ Fees required under 37 CFR 1.18.

SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT REQUIRED	
NAME	LEONARD P. DIANA
SIGNATURE	
DATE	JUNE 29, 1999

NY_MAIN 12285 v 1

TITLE OF THE INVENTION

DATA COMMUNICATION CONTROL APPARATUS AND METHOD, AND DATA COMMUNICATION SYSTEM

BACKGROUND OF THE INVENTION

This invention relates to a data communication control apparatus and method for implementing a multipoint videoconferencing system by controlling the communication of video and audio signals among a plurality of terminals. The invention relates also to a data communication system that includes this data communication control apparatus.

Multipoint videoconferencing systems that are currently proliferating make it possible for videoconferencing terminals in compliance with the standard of ITU-T Recommendation H.320 to communicate with one another from multiple locations.

ITU-T Recommendation H.231, which defines the functional framework of multipoint connection devices and the form of multipoint communications, and ITU-T Recommendation H.243, which establishes an in-channel communications procedure, have been set up as standards relating to multipoint connection equipment for controlling the connections at the multiple locations of

videoconferencing terminals.

Fig. 6 is a block diagram illustrating the configuration of a multipoint videoconferencing system according to the prior art. The system includes a multipoint connection apparatus 122 compliant with H.231 and H.234, and videoconferencing terminals 121 compliant with H.320. The multipoint connection apparatus 122 interconnects the videoconferencing terminals 121 located at three or more points and supervises audio mixing, distribution of video data or multiple-screen synthesis of video data and chairperson control for facilitating conferencing. Thus, if the videoconferencing terminals are in compliance with H.320, a multipoint video conference connecting a plurality of remote locations can be realized by connecting the terminals via the multipoint connection apparatus.

However, an H.320-compliant videoconferencing terminal is very expensive because it is a dedicated terminal that necessitates high-load signal processing such as the compression and decompression of video data (ITU-T Recommendations H.261, H.263, etc.). Accordingly, it is difficult to realize a low-cost, low-power-consumption terminal that is capable of participating in videoconferencing, and to make such a terminal portable.

As a consequence of the foregoing, only a dedicated terminal can participate in conventional multipoint videoconferencing. In other words, a user can participate in conferencing only from a location at which a dedicated terminal has been installed.

In order to solve this problem, it has been proposed to provide the conventional multipoint connection apparatus not only with the function for interconnecting H.320-compliant videoconferencing terminals but also with a so-called voice gateway function that makes possible participation in a multipoint videoconferencing system by ordinary telephone.

Fig. 7 is a block diagram showing the configuration of a multipoint videoconferencing equipped with a telephone-based voice gateway function. As shown in Fig. 7, a plurality of dedicated videoconferencing terminals 131 and an ordinary telephone 133 are connected by a multipoint connection apparatus 132. In this system it is possible for the ordinary telephone 133 to participate in a multipoint video conference by voice only.

In a multipoint videoconferencing system of the kind illustrated in Fig. 7, it is possible to participate in a conference from an ordinary telephone but a sufficiently realistic sense of conference

participation is not obtained merely by telephone-based voice. In addition, since participation in a conference from a telephone is limited to audio, naturally it is impossible to participate in data conferencing in accordance with ITU-T Recommendation T.120.

SUMMARY OF THE INVENTION

Accordingly, it is an object of the present invention to provide a data communication control apparatus and method, as well as a data communication system, in which participation in a multipoint video conference by voice is possible from a general-purpose terminal.

According to the present invention, the foregoing object is attained by providing a data communication control apparatus for controlling data communication among a plurality of connected communication terminals, comprising: connecting means for connecting a general-purpose terminal; image generating means for generating image data that conforms to the general-purpose terminal; image distributing means for distributing the image data, which has been generated by the image generating means, to the general-purpose terminal via the connecting means; audio converting means for converting format of audio data in order that the audio

data may be communicated mutually between the general-purpose terminal and the plurality of communication terminals; and audio distributing means for distributing the audio data, whose format has been converted by the audio converting means, to the communication terminals and/or general-purpose terminal.

As a result, it is possible to view images and to communicate by voice with a communications terminal at a general-purpose terminal. Participation in a video conference from a general-purpose terminal thus becomes feasible.

Another object of the present invention is to provide a data communication control apparatus and method, as well as a data communication system, in which participation in a multipoint video conference by text chat is possible from a general-purpose terminal.

According to the present invention, the foregoing object is attained by providing a data communication control apparatus for controlling data communication among a plurality of connected communication terminals, comprising: connecting means for connecting a general-purpose terminal; image generating means for generating image data that conforms to the general-purpose terminal; image distributing means for distributing the image data, which has been generated by the image generating means, to the general-purpose terminal via

the connecting means; voice recognition means for recognizing voice data that has entered from the communication terminals and generating text data based upon this recognition; and data distributing means for distributing the text data to the general-purpose terminal.

As a result, it is possible to view images and to engage in a text chat with a communications terminal at a general-purpose terminal. Participation in a video conference from a general-purpose terminal thus becomes feasible.

Another object of the present invention is to provide a data communication control apparatus and method, as well as a data communication system, in which participation in a conference by text chat is possible from a general-purpose terminal even in a case where a dedicated communication terminal in a multipoint video conference is not equipped with a data conferencing function.

According to the present invention, the foregoing object is attained by providing a data communication control apparatus for controlling data communication among a plurality of connected communication terminals, comprising: connecting means for connecting a general-purpose terminal; image generating means for generating image data that conforms to the general-purpose

terminal; image distributing means for distributing the image data, which has been generated by the image generating means, to the general-purpose terminal via the connecting means; voice recognition means for recognizing first voice data that has entered from the communication terminals and generating text data based upon this recognition; data distributing means for distributing the text data to the general-purpose terminal; voice synthesizing means for synthesizing second voice data based upon text data that has entered from the general-purpose terminal; and audio distributing means for distributing the second voice data to the communication terminals.

As a result, text data that as been entered from a general-purpose terminal is distributed to communications terminals as synthesized voice. Participation in a video conference from a general-purpose terminal thus becomes feasible.

The invention is particularly advantageous in that a general-purpose terminal can participate in a multipoint videoconferencing system in a simple manner.

Other features and advantages of the present invention will be apparent from the following description taken in conjunction with the accompanying drawings, in which like reference characters designate the same or similar parts throughout the figures

thereof.

BRIEF DESCRIPTION OF THE DRAWINGS

The accompanying drawings, which are incorporated in and constitute a part of the specification, illustrate embodiments of the invention and, together with the description, serve to explain the principles of the invention

Fig. 1 is a block diagram illustrating a multipoint videoconferencing system according to a first embodiment of the present invention;

Fig. 2 is a block diagram showing the construction of a multipoint connection apparatus in the system of Fig. 1 according to this embodiment;

Fig. 3 is a diagram showing an example of the structure of HTML data in this embodiment;

Fig. 4 is a block diagram showing the construction of a multipoint connection apparatus according to a second embodiment of the present invention;

Fig. 5 is a block diagram showing the construction of a multipoint connection apparatus according to a third embodiment of the present invention;

Fig. 6 is a block diagram illustrating a multipoint videoconferencing system according to the prior art; and

Fig. 7 is a block diagram showing the configuration

of a multipoint videoconferencing system having a telephone-based gateway function according to the prior art.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Preferred embodiments of the present invention will now be described in detail in accordance with the accompanying drawings.

<First Embodiment>

Fig. 1 is a block diagram illustrating the basic configuration of a multipoint videoconferencing system according to a first embodiment of the present invention. As shown in Fig. 1, the system includes dedicated videoconferencing terminals 41a to 41d, which are terminals in compliance with the standards relating to videoconferencing stipulated by ITU-T Recommendations H.320, H.323 and H.324, etc., a videoconferencing multipoint connection apparatus 42 which, in addition to the functions relating to a conventional multipoint connection apparatus, also has a function for automatically generating HTML (HyperText Markup Language) data and an HTTP (HyperText Transfer Protocol) server function.

The system further includes general-purpose communication terminals 43a, 43b. Data such as video

and audio that has been stored in the HTTP server within the multipoint connection apparatus 42 can be displayed or converted to sound by the general-purpose communication terminals 43a, 43b. Personal computers or network computers incorporating a so-called WWW browser are applicable as the general-purpose communication terminals 43a, 43b. Recent progress in semiconductor technologies also makes it possible to use simpler transportable terminals.

Lines 44a to 44f connect the terminals to the multipoint connection apparatus 42. A public network such as an ISDN or PSTN and a LAN (Local Area Network) such as the Ethernet are applicable. It is assumed here that the general-purpose communication terminals 43a, 43b are connected to the multipoint connection apparatus 42 via the lines 44e, 44f, respectively, in accordance with the IP (Internet Protocol).

Thus, in this embodiment, the already existing videoconferencing terminals 41a to 41d and the general-purpose communication terminals 43a, 43b such as personal computers or network computers are interconnected by simple means.

Fig. 2 is a block diagram showing the details of the multipoint connection apparatus 42 according to this embodiment. As shown in Fig. 2, the apparatus includes network interface units 11a to 11c through which the

videoconferencing terminals 41a to 41d are accommodated in this system. These units supervise line interfaces of an ISDN or PSTN, etc. Multiplexer/demultiplexers 12a to 12c apply multiplex/demultiplex processing to various data relating to images, voice and control, etc. The multiplexer/demultiplexers 12a to 12c are in compliance with H.221, by way of example. The number of network interfaces and multiplexer/demultiplexers in the multipoint connection apparatus 42 correspond to the number of dedicated videoconferencing terminals capable of being connected to the multipoint connection apparatus 42.

Network interface units 20a, 20b are for connecting general-purpose terminals. As in the manner of the network interface units 11a to 11c for the dedicated videoconferencing terminals, these network interface units supervise interfaces of a public network, such an ISDN or PSTN, etc., or interfaces of a LAN such as the Ethernet.

An audio processor 13 applies decoding/mixing processing to audio code data from the dedicated videoconferencing terminals 41a to 41d, thenceforth encodes the data again and distributes it to each of the dedicated videoconferencing terminals 41a to 41d and to a voice-communication protocol converter 21. An image switching unit 14 selectively switches among image

signals, which are distributed to the dedicated videoconferencing terminals 41a to 41d, in accordance with a control signal issued by a chairperson terminal, by way of example. A data distribution unit 15 executes processing for distributing T.120-compliant data conferencing data, etc. A system controller 16 carries out overall control of the system. An image converter 17 generates still pictures by decompressing moving-picture code data that has been demultiplexed by the multiplexer/demultiplexers 12a to 12c.

An HTML data generator 18 converts, to HTML files, still pictures generated by the image converter 17 and various information relating to videoconferencing in this system. An HTTP server 19 provides various videoconferencing information generated by the HTML data generator 18 to the general-purpose communication terminals 43a, 43b connected to the multipoint connection apparatus 42.

The voice-communication protocol converter 21 performs mutual conversion of encoding methods and protocols in order to realize mutual communication of audio data among the videoconferencing terminals 41a - 41d and general-purpose communication terminals 43a, 43b connected to the multipoint connection apparatus 42.

A controller 30 has a CPU 31, a ROM 32 and a RAM 33. The CPU 31 performs overall control of the above-

mentioned components in accordance with a control program stored in the ROM 32. The RAM 33 is used as the working area of the CPU 31.

The operation of the multipoint connection apparatus 42 in the videoconferencing system of this embodiment will be described in detail with reference to Fig. 2.

Multimedia multiplexed data that has been sent to the multipoint connection apparatus 42 via the dedicated network interfaces 11a to 11c accommodating the videoconferencing terminals 41a to 41d is demultiplexed to audio code data, video code data and low-speed data for data conferencing by the multiplexer/demultiplexers 12a to 12c. The demultiplexed audio code data is decoded by the audio processor 13 and mixed with data obtained by decoding other audio code data that has been demultiplexed by any of the multiplexer/demultiplexers 12a to 12c.

It should be noted that audio code data enters the multipoint connection apparatus 42 also from the general-purpose communication terminals 43a, 43b via the network interfaces 20a, 20b. This audio code data is subjected to a protocol conversion by the voice-communication protocol converter 21 so as to conform to the videoconferencing terminals 41a to 41d. The audio processor 13 decodes the protocol-converted audio code

data from the general-purpose terminals 43a, 43b, mixes this data with decoded data obtained by decoding the audio code data from the videoconferencing terminals 41a to 41d and then encodes the results.

The mixed audio code data is multiplexed with image data in the multiplexer/demultiplexers 12a - 12c and the multiplexed data is distributed to the dedicated videoconferencing terminals 41a - 41d. At the same time, the mixed audio code data is converted to a prescribed protocol by the voice-communication protocol converter 21, after which the resulting data is sent to the general-purpose terminals 43a, 43b via the network interfaces 20a, 20b.

Mutual communication of audio data is performed in real-time between the general-purpose communication terminals 43a, 43b and the multipoint connection apparatus 42 by RTP (Real-Time Transfer Protocol) of the IP. That is, the voice-communication protocol converter 21 performs a mutual conversion between the Internet protocol and the videoconferencing protocol in relation to the audio data.

Among the various items of video code data demultiplexed by the multiplexer/demultiplexers 12a to 12c, the video code data from a terminal designated by the image switching unit 14 is sent to the multiplexer/demultiplexers 12a to 12c, whence the data

is distributed to the videoconferencing terminals 41a to 41d. The video code data demultiplexed by the multiplexer/demultiplexers 12a to 12c is sent also to the image converter 17 at the same time. The image converter 17 decodes the coded video data and converts one frame of video data to a still picture. The still picture obtained by the conversion is compressed by an encoding method stipulated by the JPEG (Joint Photographic Experts Group), by way of example.

The HTML data generator 18 generates HTML data based upon the still picture from each terminal generated by the image converter 17 and information relating to videoconferencing. The HTTP server 19 provides the HTML data generated by the HTML data generator 18 to the general-purpose communication terminals 43a, 43b, which possess an HTML viewer function, connected to the network interfaces 20a, 20b.

Fig. 3 illustrates the manner in which HTML files generated by the HTML data generator 18 are perused by an HTML viewer. As shown in Fig. 3, a window 51 indicates information relating to a videoconference. By way of example, the window 51 presents conference starting time and information relating to participants. Windows 52a to 52e display still pictures generated by the image converter 17, e.g., still pictures of the participants taking part in the conference by each of

the terminals. A window 53 is for T.120-compliant data conferencing. This window displays text chat, shared applications, etc.

Thus, in accordance with this embodiment, as described above, the user of a general-purpose terminal connected to a network interface via a network is enabled, by an IP-related protocol such as RTP, to perform voice communication with other dedicated videoconferencing terminals and is also enabled to peruse video from a dedicated videoconferencing terminal as a still picture by utilizing an HTML viewer.

Further, an ordinary personal computer or network computer having an audio input/output function can be employed as the general-purpose terminal that implements the above functions. As a result, a person can participate in a conventional multipoint video conference from any location via an ordinary telephone line and it also becomes readily feasible to participate in a conference from a transportable terminal.

<Second Embodiment>

A second embodiment according to the present invention will now be described.

Since the basic configuration of the videoconferencing system according to the second embodiment is similar to that shown in Fig. 1, which illustrates the first embodiment, it need not be

described again here. The multipoint connection apparatus 42 according to the second embodiment, besides having the functions relating to the conventional multipoint connection apparatus, is provided not only with the function for automatically generating HTML data and the HTTP server function but also with a function through which the content of a conversion with a person speaking at a conference is converted to text by a voice recognition mechanism.

Fig. 4 is block diagram showing the details of the multipoint connection apparatus 42 according to the second embodiment. Components in Fig. 4 identical with those of the first embodiment illustrated in Fig. 2 are designated by like reference characters and are not described again.

In Fig. 4, the audio processor 13 applies decoding/mixing processing to audio code data from the dedicated videoconferencing terminals 41a to 41d, thenceforth encodes the data again and distributes it to each of the dedicated videoconferencing terminals 41a to 41d and to a voice recognition unit 22. The latter subjects the audio data, which has been mixed by the audio processor 13, to recognition processing. The operation of the videoconferencing system according to the second embodiment will be described in detail with reference to the system configuration shown in Fig. 4.

Operational aspects similar to those of the first embodiment need not be described in detail again.

Multiplexed multimedia data that has been sent to the multipoint connection apparatus 42 via the network interfaces 11a to 11c accommodating the dedicated videoconferencing terminals 41a to 41d is demultiplexed to audio code data, video code data and low-speed data for data conferencing by the multiplexer/demultiplexers 12a to 12c.

The demultiplexed audio code data is decoded by the audio processor 13 and mixed with data obtained by decoding other audio code data that has been demultiplexed by any of the multiplexer/demultiplexers 12a to 12c. The mixed audio code data is coded further, after which the resulting data is multiplexed with image data in the multiplexer/demultiplexers 12a to 12c and then distributed to the dedicated videoconferencing terminals 41a to 41d. At the same time, the audio data that has been mixed by the audio processor 13 is sent to the voice recognition unit 22.

The voice recognition unit 22 subjects the input audio data to recognition processing and converts the obtained results to text data. The text data generated is distributed to the general-purpose terminals 43a, 43b as text-chat data in a data conferencing function in compliance with T.120, by way of example. It should be

noted that the data conferencing function mentioned here is one through which mutual communication of text-chat data is performed between the multipoint connection apparatus 42 and the general-purpose terminals 43a, 43b connected to the network interfaces 20a, 20b. Accordingly, text data that has entered from the general-purpose terminals 43a, 43b also is displayed in the text-chat window of the dedicated videoconferencing terminals 41a to 41d. The data distribution unit 15 supervises distribution processing relating to this data communication. Meanwhile, in a manner similar to that of the first embodiment, video code data that has been demultiplexed by the multiplexer/demultiplexers 12a to 12c is decoded by the image converter 17 and converted to HTML data by the HTML data generator 18 so that it can be viewed in the manner shown in Fig. 3. In Fig. 3, the window 53 for data conferencing compliant with T.120, etc., displays, in the form of text chat, text data obtained in the voice recognition unit 22 based upon voice data that has entered from the dedicated videoconferencing terminals 41a to 41d. An example of the text chat is the content of remarks made by participants at a conference.

The users of the general-purpose terminals 43a, 43b are capable of entering their own remarks at a conference in the form of text displayed in the window

53. Entered text data is distributed to the dedicated videoconferencing terminals 41a to 41d. More specifically, the users of the general-purpose terminals 43a, 43b are capable of mutual text-based communication with the users of the dedicated videoconferencing terminals 41a to 41d by way of the text-chat function.

Thus, in accordance with this embodiment, as described above, the user of a general-purpose terminal connected to a network interface via a network is capable of performing text-data-based mutual communication with a dedicated videoconferencing terminal by utilizing a text-chat function. Furthermore, video from a dedicated videoconferencing terminal can be viewed as a still picture by utilizing an HTML viewer. In addition, a personal computer or network computer having a comparatively handy functional architecture that does not include a multimedia function can be used as the general-purpose terminal for implementing the above-mentioned functions. As a result, participation in a multipoint videoconference from any location and from a transportable terminal is made easier.

<Third Embodiment>

A third embodiment according to the present invention will now be described.

Since the basic configuration of the

videoconferencing system according to the third embodiment is similar to that shown in Fig. 1, which illustrates the first embodiment, it need not be described again here. The multipoint connection apparatus 42 according to the third embodiment has a voice synthesizing function in addition to the function for converting the content of remarks to text by the voice recognition mechanism described in the second embodiment.

Fig. 5 is block diagram showing the details of the multipoint connection apparatus 42 according to the third embodiment. Components in Fig. 5 identical with those of the second embodiment illustrated in Fig. 4 are designated by like reference characters and are not described again.

In Fig. 5, a voice synthesizer 23, the input to which is text data sent from the general-purpose terminals 43a, 43b connected to the network interfaces 20a, 20b, executes voice synthesizing processing for converting the content of the text data to voice data. The synthesized voice data is mixed by the audio processor 13 with voice data that has been sent from the dedicated videoconferencing terminals 41a to 41d and the resulting data is distributed to the appropriate dedicated videoconferencing terminals 41a to 41d again. As a result, text-chat data from conference participants

using the general-purpose terminals 43a, 43b can be heard as voice information by the conference participants using the dedicated videoconferencing terminals 41a to 41d.

Thus, in accordance with the third embodiment, as described above, even if a dedicated videoconferencing terminal does not possess a data conferencing function such as a text-chat function, mutual communication with a general-purpose terminal connected to the videoconferencing system can be realized by synthesized voice.

In each of the embodiments described above, it is explained that still-picture generation in the image converter 17 is performed at an arbitrary timing. However, it is also possible to start the conversion processing in response to commands from the general-purpose terminals 43a, 43b, by way of example. In such case the users of the general-purpose terminals 43a, 43b select the image windows 52a to 52e updated on the HTML browser, and the image converter 17 starts the conversion of the image and re-generates the still-picture data in response to an image request signal that conforms to the selection made, whereby the window display is updated. By thus generating a still picture, which is displayed in a window, in accordance with a timing designated by a user, even the users that have

connected from the general-purpose terminals 43a, 43b can share the necessary images in the course of a conference.

Further, in each of the foregoing embodiments, examples in which HTML and an HTTP server are used as the means of supplying image data to the general-purpose terminals 43a, 43b are described. However, the present invention is not limited to such an arrangement. Any method of supplying image data may be utilized so long as it is one through which hyperlinked multimedia data can be supplied.

Further, in regard to the voice communication protocol for voice communication with the general-purpose terminals 43a, 43b, any protocol may be used so long as it makes real-time communication possible.

<Other Embodiments>

The present invention can be applied to a system constituted by a plurality of devices (e.g., a host computer, interface, reader, printer, etc.) or to an apparatus comprising a single device (e.g., a copier or facsimile machine, etc.).

Furthermore, it goes without saying that the object of the invention is attained also by supplying a storage medium storing the program codes of the software for performing the functions of the foregoing embodiments to a system or an apparatus, reading the program codes with

a computer (e.g., a CPU or MPU) of the system or apparatus from the storage medium, and then executing the program codes.

In this case, the program codes read from the storage medium implement the novel functions of the invention, and the storage medium storing the program codes constitutes the invention.

Further, the storage medium, such as a floppy disk, hard disk, optical disk, magneto-optical disk, CD-ROM, CD-R, magnetic tape, non-volatile type memory card or ROM can be used to provide the program codes.

Furthermore, besides the case where the aforesaid functions according to the embodiments are implemented by executing the program codes read by a computer, it goes without saying that the present invention covers a case where an operating system or the like running on the computer performs a part of or the entire process in accordance with the designation of program codes and implements the functions according to the embodiments.

It goes without saying that the present invention further covers a case where, after the program codes read from the storage medium are written in a function extension board inserted into the computer or in a memory provided in a function extension unit connected to the computer, a CPU or the like contained in the function extension board or function extension unit

performs a part of or the entire process in accordance with the designation of program codes and implements the function of the above embodiment.

As many apparently widely different embodiments of the present invention can be made without departing from the spirit and scope thereof, it is to be understood that the invention is not limited to the specific embodiments thereof except as defined in the appended claims.

WHAT IS CLAIMED IS:

1. A data communication control apparatus for controlling data communication among a plurality of connected communication terminals, comprising:

connecting means for connecting a general-purpose terminal;

image generating means for generating image data that conforms to the general-purpose terminal;

image distributing means for distributing the image data, which has been generated by said image generating means, to the general-purpose terminal via said connecting means;

audio converting means for converting format of audio data in order that the audio data may be communicated mutually between the general-purpose terminal and the plurality of communication terminals; and

audio distributing means for distributing the audio data, whose format has been converted by said audio converting means, to the communication terminals and/or general-purpose terminal.

2. The apparatus according to claim 1, wherein said audio distributing means distributes audio data, which has entered from the general-purpose terminal and whose format has been converted by said audio converting means, to the communication terminals, and distributes

audio data, which has entered from the communication terminals and whose format has been converted by said audio converting means, to the general-purpose terminal.

3. The apparatus according to claim 1, wherein said audio converting means converts a voice communication protocol in the audio data.

4. The apparatus according to claim 3, wherein a voice communication protocol that corresponds to the general-purpose terminal makes real-time communication possible.

5. The apparatus according to claim 4, wherein the voice communication protocol that corresponds to the general-purpose terminal is the Internet Protocol.

6. The apparatus according to claim 5, wherein the voice communication protocol that corresponds to the general-purpose terminal is the Real-Time Transfer Protocol.

7. The apparatus according to claim 1, further comprising:

voice recognition means for recognizing voice data that has entered from the communication terminals and generating text data based upon this recognition; and

data distributing means for distributing the text data to the general-purpose terminal.

8. The apparatus according to claim 7, further comprising voice synthesizing means for synthesizing voice data based upon text data that has entered from

the general-purpose terminal;

wherein said audio distributing means distributes voice data, which has been synthesized by said voice synthesizing means, to the communication terminals.

9. The apparatus according to claim 1, wherein said connecting means connects the general-purpose terminal by the Internet Protocol.

10. The apparatus according to claim 1, wherein said image generating means generates hypertext data.

11. The apparatus according to claim 10, wherein said image generating means generates hypertext data, including image data, based upon image data that has entered from the communication terminals.

12. The apparatus according to claim 11, wherein said image generating means generates HTML-format hypertext data.

13. The apparatus according to claim 12, wherein said image distributing means is an HTTP server.

14. The apparatus according to claim 13, wherein said general-purpose terminal internally incorporates a WWW browser.

15. The apparatus according to claim 1, wherein said communication terminals are dedicated videoconferencing terminals in compliance with any of ITU-T Recommendations H.320, H.323 and H.324.

16. The apparatus according to claim 15, wherein the

data communication control apparatus is in compliance with ITU-T Recommendations H.231 and H.243.

17. The apparatus according to claim 1, wherein said image generating means generates still-picture data from moving-picture data.

18. The apparatus according to claim 17, wherein said image generating means generates still-picture data based upon a command from the general-purpose terminal.

19. A data communication control apparatus for controlling data communication among a plurality of connected communication terminals, comprising:

connecting means for connecting a general-purpose terminal;

image generating means for generating image data that conforms to the general-purpose terminal;

image distributing means for distributing the image data, which has been generated by said image generating means, to the general-purpose terminal via said connecting means;

voice recognition means for recognizing voice data that has entered from the communication terminals and generating text data based upon this recognition; and

data distributing means for distributing the text data to the general-purpose terminal.

20. The apparatus according to claim 19, wherein said data distributing means distributes the text data in

real-time.

21. The apparatus according to claim 19, wherein said data distributing means distributes text data, which has entered from the general-purpose terminal, to the communication terminals.

22. The apparatus according to claim 19, wherein said voice recognition means generates text-chat data.

23. The apparatus according to claim 22, wherein said general-purpose terminal has a data conferencing function based upon text-chat data.

24. The apparatus according to claim 23, wherein the communication terminals have a data conferencing function based upon text-chat data.

25. The apparatus according to claim 22, wherein the text-chat data is in compliance with ITU-T Recommendation T.120.

26. The apparatus according to claim 19, wherein said connecting means connects the general-purpose terminal by the Internet Protocol.

27. The apparatus according to claim 26, wherein said image generating means generates HTML-format hypertext data, including image data, based upon image data that has entered from the communication terminals.

28. The apparatus according to claim 27, wherein said image distributing means is an HTTP server.

29. The apparatus according to claim 19, wherein said

communication terminals are dedicated videoconferencing terminals in compliance with any of ITU-T Recommendations H.320, H.323 and H.324.

30. The apparatus according to claim 29, wherein the data communication control apparatus is in compliance with ITU-T Recommendations H.231 and H.243.

31. A data communication control apparatus for controlling data communication among a plurality of connected communication terminals, comprising:

connecting means for connecting a general-purpose terminal;

image generating means for generating image data that conforms to the general-purpose terminal;

image distributing means for distributing the image data, which has been generated by said image generating means, to the general-purpose terminal via said connecting means;

voice recognition means for recognizing first voice data that has entered from the communication terminals and generating text data based upon this recognition;

data distributing means for distributing the text data to the general-purpose terminal;

voice synthesizing means for synthesizing second voice data based upon text data that has entered from the general-purpose terminal; and

audio distributing means for distributing the

second voice data to the communication terminals.

32. The apparatus according to claim 31, wherein the general-purpose terminal has a data conferencing function based upon text-chat data.

33. The apparatus according to claim 32, wherein the text-chat data is in compliance with ITU-T Recommendation T.120.

34. The apparatus according to claim 31, wherein said connecting means connects the general-purpose terminal by the Internet Protocol.

35. The apparatus according to claim 34, wherein said image generating means generates HTML-format hypertext data, including image data, based upon image data that has entered from the communication terminals.

36. The apparatus according to claim 35, wherein said image distributing means is an HTTP server.

37. The apparatus according to claim 19, wherein said communication terminals are dedicated videoconferencing terminals in compliance with any of ITU-T Recommendations H.320, H.323 and H.324.

38. The apparatus according to claim 37, wherein the data communication control apparatus is in compliance with ITU-T Recommendations H.231 and H.243.

39. A control method in a data communication control apparatus for controlling data communication between a connected communication terminal and general-purpose

terminal, comprising:

an image generating step of generating image data that conforms to the general-purpose terminal;

an image distributing step of distributing the image data, which has been generated at said image generating step, to the general-purpose terminal;

a first audio distributing step of converting format of audio data that has entered from the general-purpose terminal and distributing the audio data to the communication terminal; and

a second audio distributing step of converting format of audio data that has entered from the communication terminal and distributing the audio data to the general-purpose terminal.

40. A control method in a data communication control apparatus for controlling data communication between a connected communication terminal and general-purpose terminal, comprising:

an image generating step of generating image data that conforms to the general-purpose terminal;

an image distributing step of distributing the image data, which has been generated at said image generating step, to the general-purpose terminal;

a voice recognition step of recognizing voice data that has entered from the communication terminal and generating text data based upon this recognition; and

a data distributing step of distributing the text data to the general-purpose terminal.

41. A control method in a data communication control apparatus for controlling data communication between a connected communication terminal and general-purpose terminal, comprising:

an image generating step of generating image data that conforms to the general-purpose terminal;

an image distributing step of distributing the image data, which has been generated at said image generating step, to the general-purpose terminal;

a voice recognition step of recognizing first voice data that has entered from the communication terminal and generating text data based upon this recognition;

a data distributing step of distributing the text data to the general-purpose terminal;

a voice synthesizing step of synthesizing second voice data based upon text data that has entered from the general-purpose terminal; and

an audio distributing step of distributing the second voice data to the communication terminal.

42. A data communication system in which a plurality of communication terminals are connected via a data communication control apparatus and data communication is performed among said plurality of communication terminals, wherein said data communication control

apparatus comprises:

connecting means for connecting a general-purpose terminal;

image generating means for generating image data that conforms to the general-purpose terminal;

image distributing means for distributing the image data, which has been generated by said image generating means, to the general-purpose terminal via said connecting means;

audio converting means for converting format of audio data in order that the audio data may be communicated mutually between the general-purpose terminal and the plurality of communication terminals; and

audio distributing means for distributing the audio data, whose format has been converted by said audio converting means, to the communication terminals and/or general-purpose terminal.

43. A data communication system in which a plurality of communication terminals are connected via a data communication control apparatus and data communication is performed among said plurality of communication terminals, wherein said data communication control apparatus comprises:

connecting means for connecting a general-purpose terminal;

image generating means for generating image data that conforms to the general-purpose terminal;

image distributing means for distributing the image data, which has been generated by said image generating means, to the general-purpose terminal via said connecting means;

voice recognition means for recognizing voice data that has entered from the communication terminals and generating text data based upon this recognition; and

data distributing means for distributing the text data to the general-purpose terminal.

44. A data communication system in which a plurality of communication terminals are connected via a data communication control apparatus and data communication is performed among said plurality of communication terminals, wherein said data communication control apparatus comprises:

connecting means for connecting a general-purpose terminal;

image generating means for generating image data that conforms to the general-purpose terminal;

image distributing means for distributing the image data, which has been generated by said image generating means, to the general-purpose terminal via said connecting means;

voice recognition means for recognizing first voice

data that has entered from the communication terminals and generating text data based upon this recognition;

data distributing means for distributing the text data to the general-purpose terminal;

voice synthesizing means for synthesizing second voice data based upon text data that has entered from the general-purpose terminal; and

audio distributing means for distributing the second voice data to the communication terminals.

45. A recording medium on which has been recorded program code of a control method in a data communication control apparatus for controlling data communication between a connected communication terminal and general-purpose terminal, said program code comprising at least:

code of an image generating step of generating image data that conforms to the general-purpose terminal;

code of an image distributing step of distributing the image data, which has been generated at said image generating step, to the general-purpose terminal;

code of a first audio distributing step of converting format of audio data that has entered from the general-purpose terminal and distributing the audio data to the communication terminal; and

code of a second audio distributing step of converting format of audio data that has entered from

the communication terminal and distributing the audio data to the general-purpose terminal.

46. A recording medium on which has been recorded program code of a control method in a data communication control apparatus for controlling data communication between a connected communication terminal and general-purpose terminal, said program code comprising at least:

code of an image generating step of generating image data that conforms to the general-purpose terminal;

code of an image distributing step of distributing the image data, which has been generated at said image generating step, to the general-purpose terminal;

code of a voice recognition step of recognizing voice data that has entered from the communication terminal and generating text data based upon this recognition; and

code of a data distributing step of distributing the text data in real-time.

47. A recording medium on which has been recorded program code of a control method in a data communication control apparatus for controlling data communication between a connected communication terminal and general-purpose terminal, said program code comprising at least:

code of an image generating step of generating image data that conforms to the general-purpose

terminal;

code of an image distributing step of distributing the image data, which has been generated at said image generating step, to the general-purpose terminal;

code of a voice recognition step of recognizing first voice data that has entered from the communication terminal and generating text data based upon this recognition;

code of a data distributing step of distributing the text data to the general-purpose terminal;

code of a voice synthesizing step of synthesizing second voice data based upon text data that has entered from the general-purpose terminal; and

code of an audio distributing step of distributing the second voice data to the communication terminal.

ABSTRACT OF THE DISCLOSURE

In a conventional multipoint videoconferencing system, one can take part in the conference only from an H.320-compliant dedicated communication terminal. According to the present invention, a general-purpose terminal is connected to a multipoint videoconferencing system via the Internet and video from a communication terminal is converted to HTML data, which is then distributed to the general-purpose terminal. Voice communication between the communication terminal and general-purpose terminal is made possible by making a suitable conversion between the voice communication protocols of the two terminals. As a result, even a transportable general-purpose terminal, for example, can participate in videoconferencing.

FIG. 1

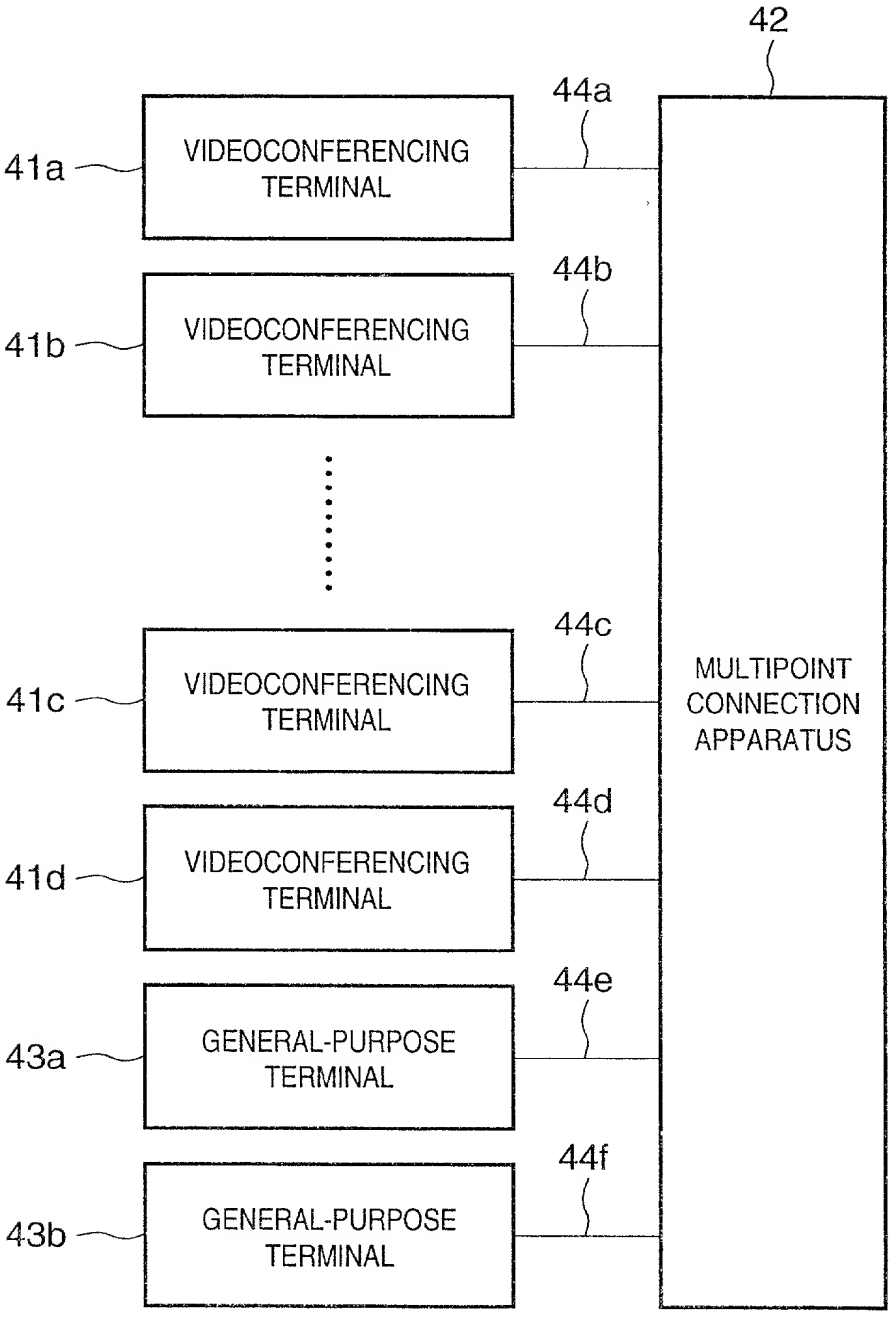

42
44a
41a
VIDEOCONFERENCING TERMINAL
44b
41b
VIDEOCONFERENCING TERMINAL
44c
41c
VIDEOCONFERENCING TERMINAL
44d
41d
VIDEOCONFERENCING TERMINAL
44e
43a
GENERAL-PURPOSE TERMINAL
44f
43b
GENERAL-PURPOSE TERMINAL
MULTIPOINT CONNECTION APPARATUS

FIG. 2

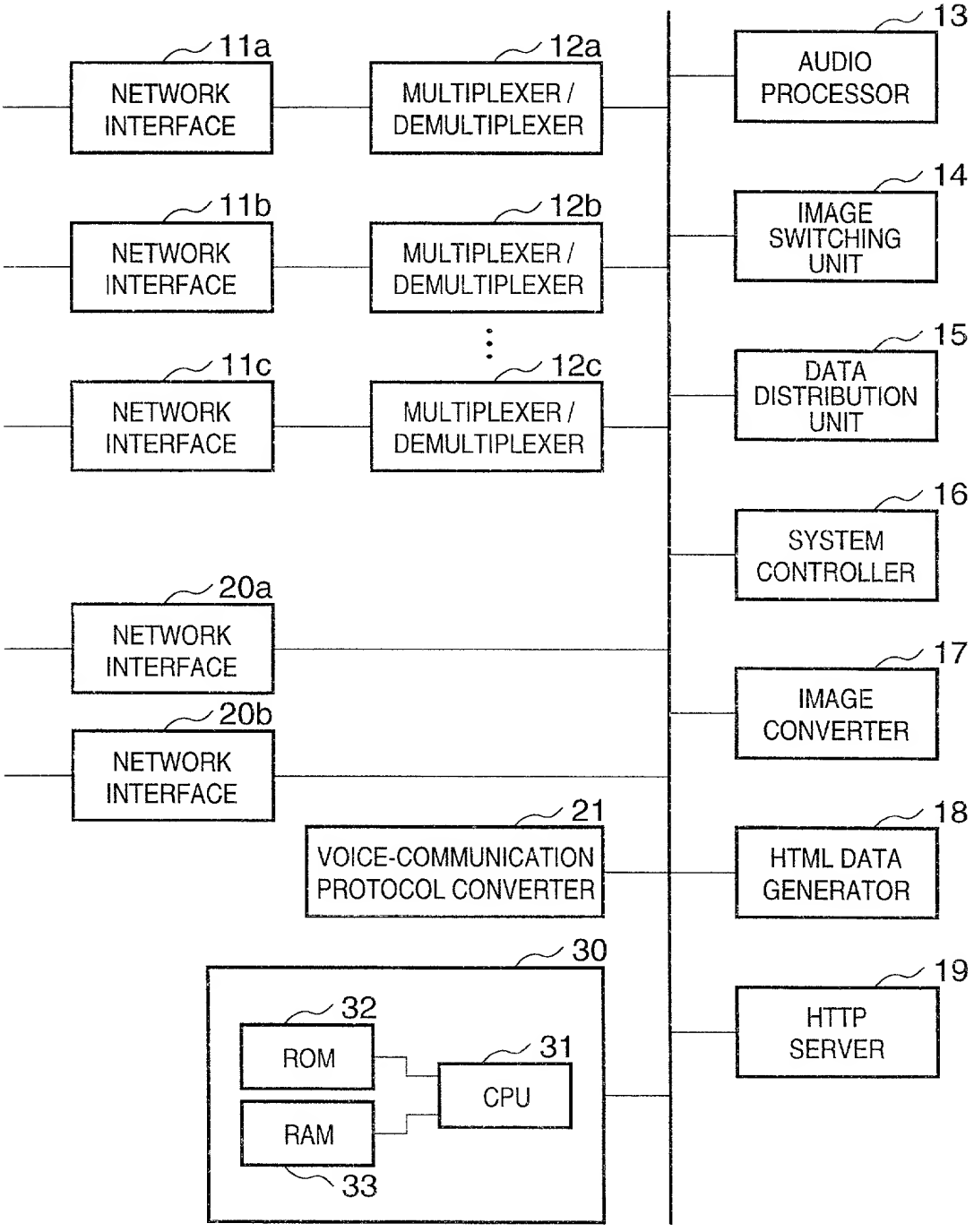

11a
NETWORK INTERFACE
12a
MULTIPLEXER / DEMULTIPLEXER
11b
NETWORK INTERFACE
12b
MULTIPLEXER / DEMULTIPLEXER
11c
NETWORK INTERFACE
12c
MULTIPLEXER / DEMULTIPLEXER
20a
NETWORK INTERFACE
20b
NETWORK INTERFACE
21
VOICE-COMMUNICATION PROTOCOL CONVERTER
30
32
ROM
RAM
33
31
CPU
13
AUDIO PROCESSOR
14
IMAGE SWITCHING UNIT
15
DATA DISTRIBUTION UNIT
16
SYSTEM CONTROLLER
17
IMAGE CONVERTER
18
HTML DATA GENERATOR
19
HTTP SERVER

FIG. 3

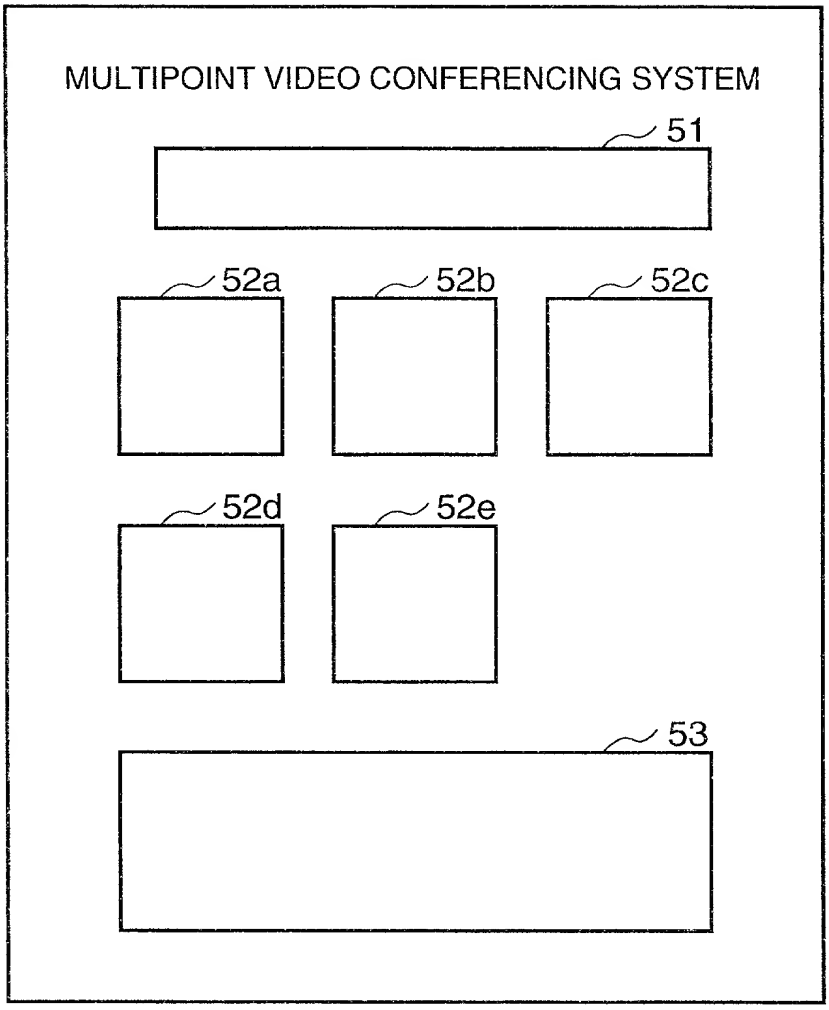

MULTIPOINT VIDEO CONFERENCING SYSTEM
51
52a
52b
52c
52d
52e
53

FIG. 4

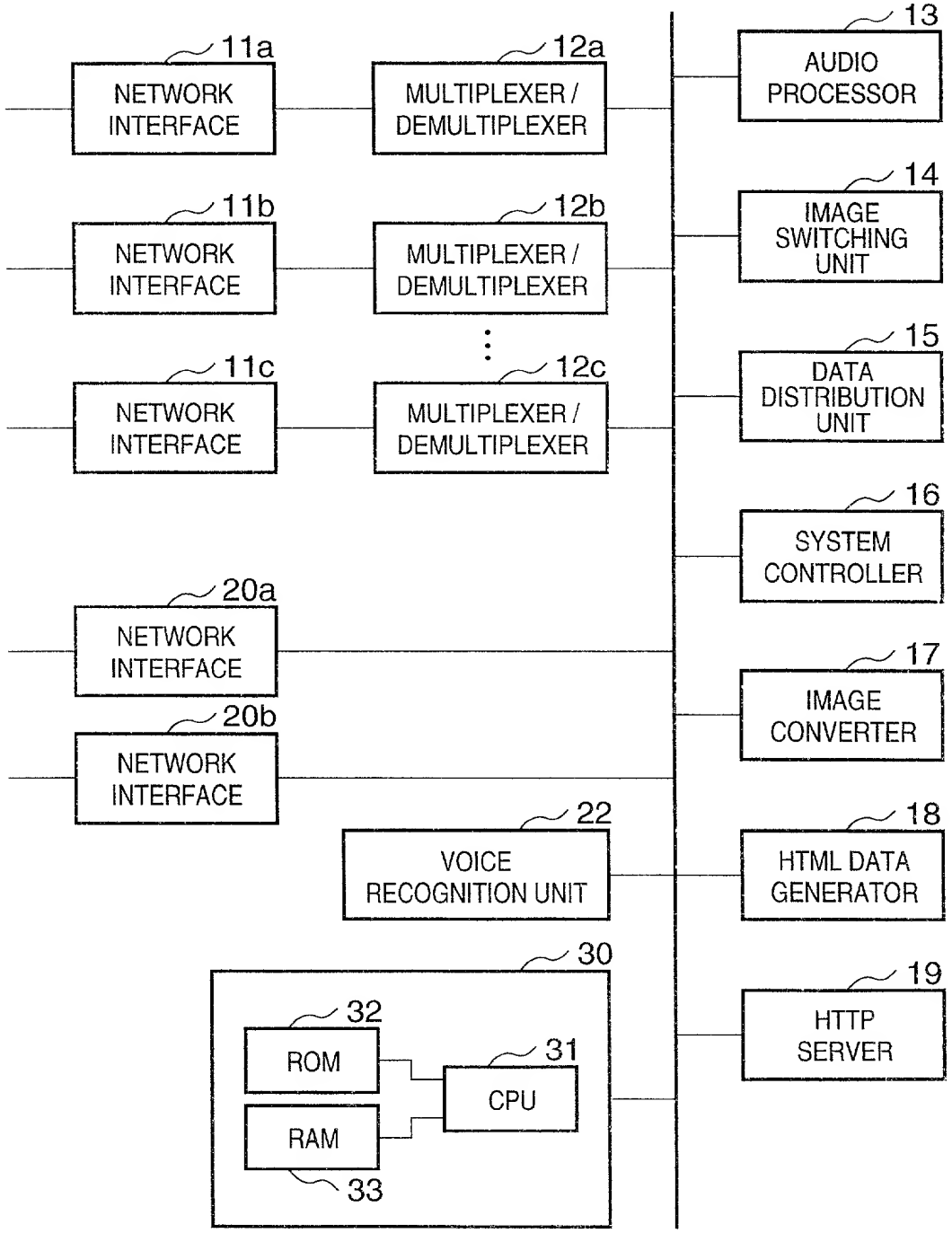

11a
NETWORK INTERFACE
12a
MULTIPLEXER / DEMULTIPLEXER
11b
NETWORK INTERFACE
12b
MULTIPLEXER / DEMULTIPLEXER
11c
NETWORK INTERFACE
12c
MULTIPLEXER / DEMULTIPLEXER
20a
NETWORK INTERFACE
20b
NETWORK INTERFACE
22
VOICE RECOGNITION UNIT
30
32
ROM
31
CPU
RAM
33
13
AUDIO PROCESSOR
14
IMAGE SWITCHING UNIT
15
DATA DISTRIBUTION UNIT
16
SYSTEM CONTROLLER
17
IMAGE CONVERTER
18
HTML DATA GENERATOR
19
HTTP SERVER

FIG. 5

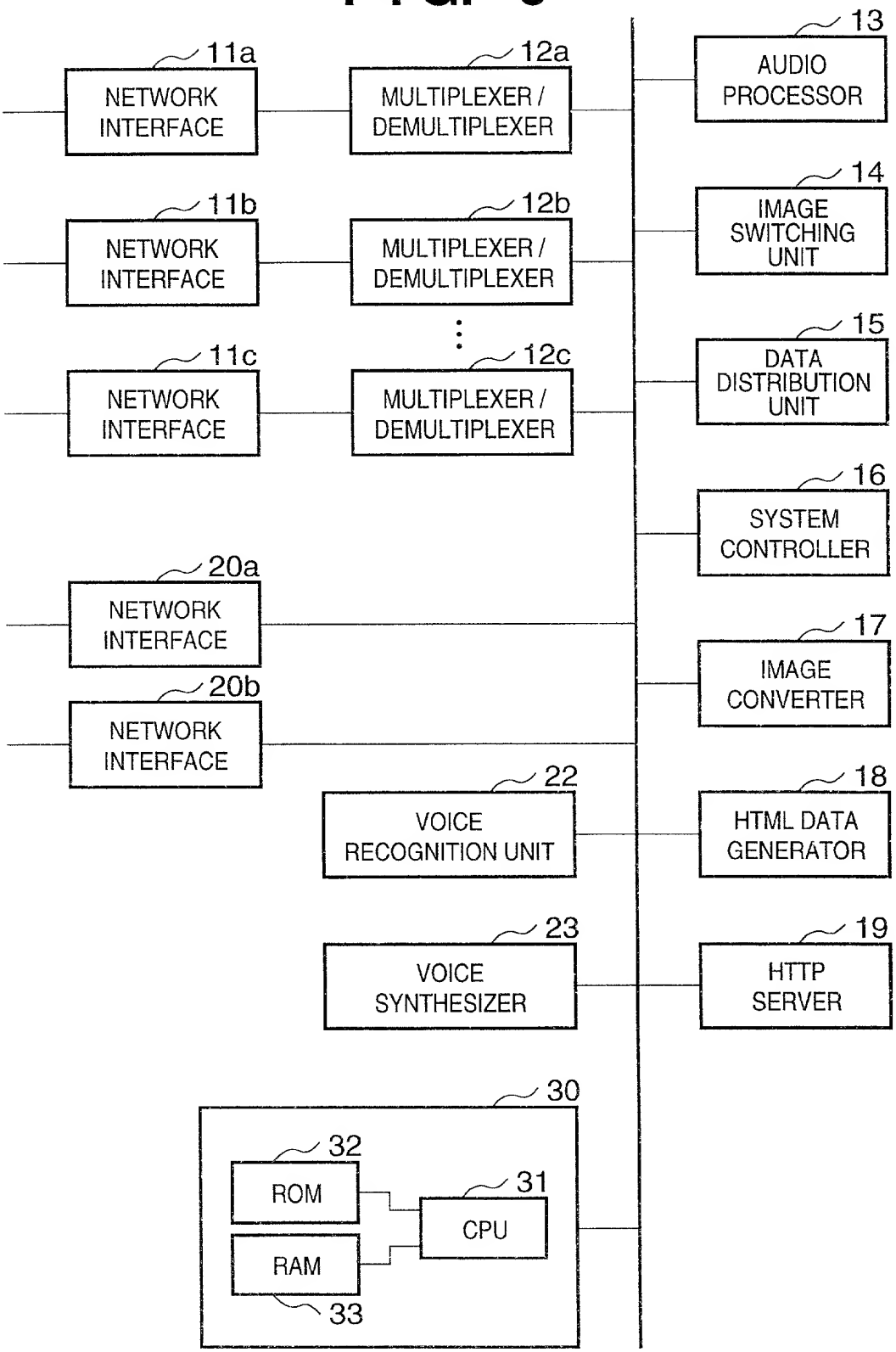

11a
NETWORK INTERFACE
12a
MULTIPLEXER / DEMULTIPLEXER
13
AUDIO PROCESSOR
11b
NETWORK INTERFACE
12b
MULTIPLEXER / DEMULTIPLEXER
14
IMAGE SWITCHING UNIT
11c
NETWORK INTERFACE
12c
MULTIPLEXER / DEMULTIPLEXER
15
DATA DISTRIBUTION UNIT
16
SYSTEM CONTROLLER
20a
NETWORK INTERFACE
20b
NETWORK INTERFACE
17
IMAGE CONVERTER
22
VOICE RECOGNITION UNIT
18
HTML DATA GENERATOR
23
VOICE SYNTHESIZER
19
HTTP SERVER
30
32
ROM
31
CPU
RAM
33

FIG. 6

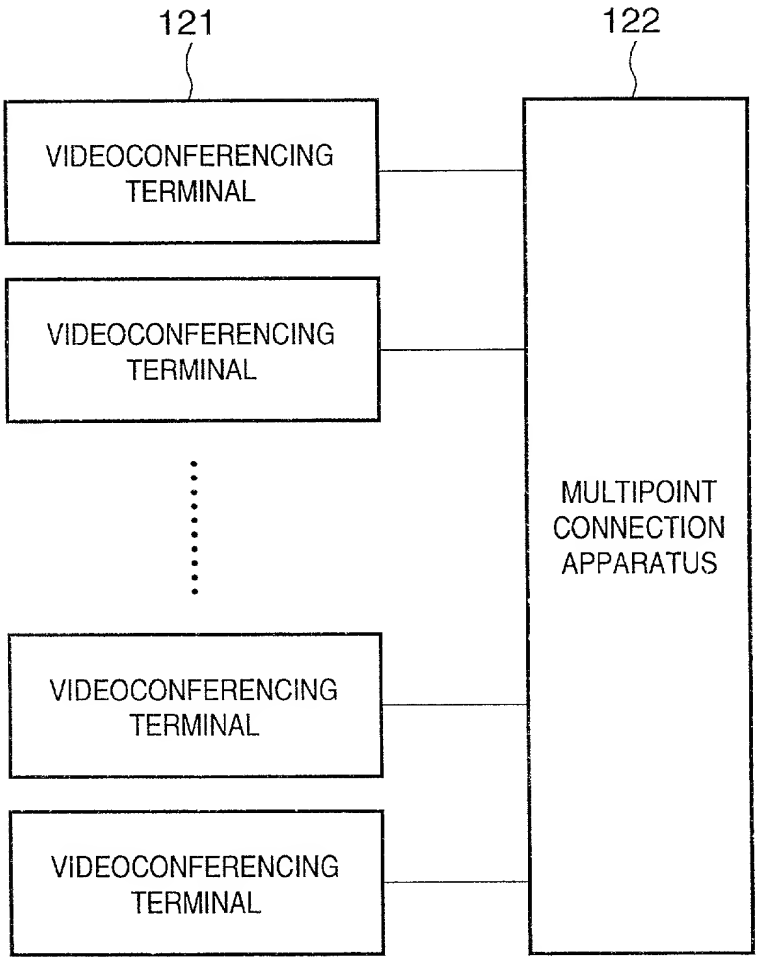
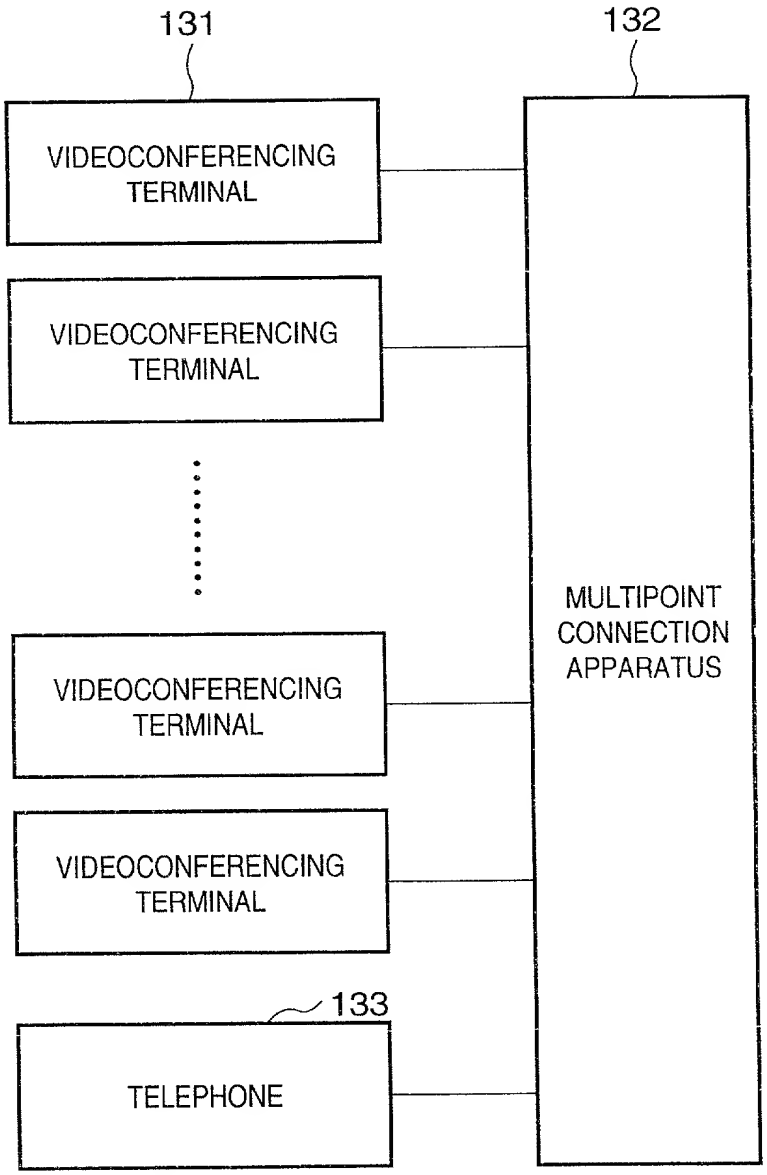

121
122
VIDEOCONFERENCING TERMINAL
VIDEOCONFERENCING TERMINAL
VIDEOCONFERENCING TERMINAL
VIDEOCONFERENCING TERMINAL
MULTIPOINT CONNECTION APPARATUS

FIG. 7


131
132
VIDEOCONFERENCING TERMINAL
VIDEOCONFERENCING TERMINAL
VIDEOCONFERENCING TERMINAL
VIDEOCONFERENCING TERMINAL
133
TELEPHONE
MULTIPOINT CONNECTION APPARATUS

CFM 1998-12/CAN:291X

COMBINED DECLARATION AND POWER OF ATTORNEY FOR PATENT APPLICATION

(Page 1)

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name;

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled

DATA COMMUNICATION CONTROL APPARATUS AND METHOD, AND DATA COMMUNICATION SYSTEM,

the specification of which [X]is attached hereto. [ ] was filed on _____

as United States Application No. or PCT International Application No. _____ and was amended on _____ (if applicable).

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to patentability as defined in 37 CFR §1.56.

I hereby claim foreign priority benefits under 35 U.S.C. §119(a)-(d) or §365(b), of any foreign application(s) for patent or inventor's certificate, or §365(a) of any PCT international application which designates at least one country other than the United States, listed below and have also identified below any foreign application for patent or inventor's certificate, or PCT international application having a filing date before that of the application on which priority is claimed:

Country	Application No.	Filed (Day/Mo./Yr.)	(Yes/No) Priority Claimed
JAPAN	10-190748	06/07/1998	Yes

I hereby appoint the practitioners associated with the firm and customer number provided below to prosecute this application and to transact all business in the Patent and Trademark Office connected therewith, and direct that all correspondence be addressed to the address associated with that Customer Number:

FITZPATRICK, CELLA, HARPER & SCINTO
Customer Number: 05514

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

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